REMARKS

Claims 1, 3-10, 12-13, 15-21, 23-25, 27-31, 42, 44-45 and 47-48 were pending in the application prior to the present amendment. Claims 4-6, 8 and 47 are herein canceled. Claims 1, 10, 13, 17, 18 and 42 are herein amended. Claim 49 has been added. Thus, claims 1, 3, 7, 9-10, 12-13, 15-21, 23-25, 27-31, 42, 44-45, 48 and 49 will be pending in the application after entry of the present amendment.

Allowable Claims

Claims 8 and 47 were indicated as being allowable. Thus, claim 1 has been amended to include the subject matter of claim 8, and claim 42 has been amended to include the subject matter of claim 47.

The Examiner's reason for declaring claim 47 to be allowable is that it recites "executing a well perforator program based on a second subset of the set of models and a second subset of the instantiated values."[1] Applicant notes that each of claims 17, 19, 21 and 48 recites very similar subject matter. For example, claim 17 recites: "automatically execute a well-perforator program on one or more well plans included in the instantiated models." Thus, according to the Examiner's reasoning these claims and their dependents should be allowable as well.

Rejections Under Section 112

Claim 13 was rejected under 35 U.S.C. Section 112, first paragraph. In particular, the Examiner asserts that the specification does not provide enablement for selecting a first geocellular reservoir model from a collection of geocellular reservoir models "*based on a first subset of the instantiated values*" as claimed. Applicant respectfully disagrees. Applicant believes the quoted feature is amply supported in the specification. For example, in the paragraph starting at page 8, line 26, the specification states:

> As yet another alternative, the user may define the uncertainty of a planning variable X by specifying *a finite set of realizations R_1, R_2, R_3, ..., R_N for the planning variable*. For example, the user may specify *a finite*

[1] See Final Action, page 19, paragraph 37.

> *list of geocellular reservoir models* by entering their file names. The user may define the uncertainty associated with the planning variable X by entering a set of positive weights V_1, V_2, V_3, …, V_N. The processor may compute a sum S_V of the weights V_1, V_2, V_3, …, V_N, and generate probability values P_1, P_2, P_3, …, P_N according to the relation $P_K=V_K/S_V$. The probability P_K is interpreted as the probability that $X=R_K$. The realizations of the planning variable may also be referred to herein as "options" or "scenarios" or "outcomes". (*Emphasis added*).

Thus, the specification clearly enables the notion that a "random variable" may have "instantiations" that correspond to "geocellular reservoir models." Furthermore, at page 9, lines 20-21, the specification teaches that a processor may "randomly generate an instantiated value for each planning variable X." In the case of the planning variable X from the quoted paragraph, one of ordinary skill would not fail to understand that the generation of an "instantiated value" would necessarily constitute the "selecting" of a geocellular reservoir model as claimed. Indeed, at page 10, lines 15-17, the specification specifically calls out such cases by referring to "a set of geocellular models *determined by* one or more of the instantiated values." (Emphasis added.) In other words, the specification is here referring to "a set of geocellular models" that have been selected by the "instantiated values" of corresponding "random variables." Thus, the specification clearly enables the feature under consideration. Therefore, the 112 rejection of claim 13 and its dependents is overcome.

Claim 17 was rejected under 35 U.S.C. Section 112, second paragraph, as being indefinite. In particular, the Examiner asserts that the occurrence of the word "automatically" in several of the recited clauses of claim 17 renders claim indefinite "because it is unclear whether the functions … are performed … without user's input … or … after user's input." Applicant respectfully disagrees with this rejection. However, in order to expedite the case towards an allowance, Applicant has removed each occurrence of the word "automatically" from the claim. Thus, the 112 rejection of claim 17 is rendered moot.

Art-Based Rejections

Claims 1, 3-7, 9-10, 12, 42, 44-45 and 46 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over TERAS[2] in view of Netemeyer[3] and Ortoleva.[4] Claims 13 and 15-16 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over TERAS in view of Netemeyer. Claims 17-21, 23-25, 27-30 and 48 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over TERAS in view of Netemeyer and Jalali.[5] Claim 31 was rejected under 35 U.S.C. Section 103(a) as being unpatentable over TERAS in view of Egyed.[6] Applicant respectfully disagrees with these rejections based on the following reasoning.

Claim 1 was rejected under Section 103(a) as being unpatentable over TERAS in view of Netemeyer and Ortoleva. Applicant respectfully disagrees with this rejection. However, in order to expedite the present application towards an allowance, claim 1 has been amended to include the subject matter of former claim 8, which was indicated to be allowable. Thus, the rejection under Section 103(a) is rendered moot.

Claim 10 was rejected under Section 103(a) as being unpatentable over TERAS in view of Netemeyer and Ortoleva. Applicant respectfully disagrees with this rejection. However, in order to expedite the present application towards an allowance, claim 10 has been amended to recite:

> wherein said instantiating the random variables includes instantiating a value of a first one of the random variables, wherein said value is instantiated in a quantile range [Q_A, Q_B] based on a user-specified probability distribution and user-specified integers A and B which are between zero and 100 inclusive.

The Examiner alleges that this feature is taught by TERAS[7] and Applicant's specification at page 8, lines 3-13. Applicant respectfully disagrees.

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[2] "TERAS Evaluation Module User Guide", Landmark – A Halliburton Company, October 2000, Part No. 157607 R98.7.
[3] U.S. Publication No. 2002/0169785 due to Netemeyer et al.
[4] U.S. Publication No. 2002/0013687 due to Ortoleva.
[5] U.S. Publication No. 2002/0177955 due to Jalali et al.
[6] Egyed, A., "A Scenario-Driven Approach to Traceability", Proceedings of the 23rd International Conference on Software Engineering (ICSE), Toronto May 2001, pp. 123-132.
[7] In particular, the Examiner points to TERAS page 189, the "Background on Sampled Values" section.

First, the cited portion of TERAS discloses a process of "Monte Carlo sampling" and states that "if you use a triangular probability distribution, Monte Carlo simulation will sample *a range of values* for minimum, maximum, and most likely for multiple iterations." (*Emphasis added.*) The "range of values" being alluded to is merely the domain of definition of the "triangular probability distribution." For example, in the first table on page 75, TERAS gives an example of a triangular distribution defined on the range from 15 to 35. (So all the probability mass of the corresponding random variable is concentrated between 15 and 35.) The values "15" and "35" are associated with the *domain* of the probability distribution. In contrast, the integers A and B that specify quantiles Q_A and Q_B are associated with the target set (i.e., the vertical axis) of the cumulative distribution function. See, e.g., the Wiki on "Quantile function" (attached herewith), which states that "a quantile function of a probability distribution is the inverse F^{-1} of its cumulative distribution function.") The target set of the cumulative distribution function runs from zero to one, e.g., as illustrated by the graphical examples shown in the Wiki on "Cumulative distribution function" (attached herewith). The integers A and B specify values A/100 and B/100 within this target set,[8] not within the domain the probability distribution. TERAS nowhere teaches any use of a quantile range $[Q_A, Q_B]$ that is based on "user-specified integers A and B." Indeed, the term "quantile" never occurs in TERAS.

Second, the Examiner points to page 8, lines 3-13 of the *Applicant's specification*. That passage states:

> In step 105, the processor may provide a system of one or more graphical user interfaces F_G through which the user may define the uncertainty associated with each planning variable. The user may define the uncertainty of a planning variable X in a number of ways. For example, the user may select a probability density function (PDF) from a displayed list of standard probability density functions, and enter PDF characterizing values for the selected PDF. The nature of the PDF characterizing values may depend on the selected PDF. A normal PDF may be characterized by its mean and standard deviation. A uniform PDF defined on the interval [A,B] is more easily characterized in terms of the values A and B. A triangular density function defined on the interval [A,B] with maximum at X=C is more easily characterized in terms of the values A, B and C. The list of standard PDFs may include PDFs for normal, log normal, uniform and triangular random variables.

[8] At page 18, last paragraph, the specification defines the notation Q_T to be "the quantile of order T/100 derived from the selected PDF."

Applicant notes that the values "A" and "B" mentioned in this passage are not the same thing as the "integers A and B" recited in the claim. The passage refers to an "interval [A,B]" which may be used to define the *domain* of a "uniform PDF" or a "triangular density function." Thus, the "A" and "B" of this passage are associated with the *domain* of the distribution functions, not with the target set of the cumulative distribution function. Therefore, as discussed above, the "A" and "B" of this passage cannot be interpreted as values A and B which specify quantiles "Q_A" and "Q_B" as claimed.

Consequently, claim 10 and its dependents are patentably distinguished over the cited references at least for the reasons given above.

Claim 13 was rejected under Section 103(a) as being unpatentable over TERAS in view of Netemeyer. Applicant respectfully disagrees with this rejection. However, in order to expedite the case towards an allowance, Claim 13 has been amended to include subject matter similar to the subject matter of allowable claim 8 ("Latin Hypercube sampling"). Thus, the 103 rejection of claim 13 is rendered moot.

Independent Claims 17, 19, 21, and 48

Claim 17 was rejected under 35 U.S.C. Section 103(a) as being unpatentable over TERAS in view of Netemeyer and Jalali. Applicant respectfully disagrees with this rejection. Claim 17 recites "execut[ing] a well-perforator program on one or more well plans included in the instantiated models in order to determine perforation locations for the one or more well plans." The Examiner points to Jalali paragraphs 107-108 as allegedly teaching this feature.[9] (Jalali paragraph 107 refers to an optimizer that "locates (at 1306) intervals in the wellbore where perforations are needed.") Furthermore, the Examiner offers the prospect of "determin[ing] optimum segmentation for the well" as motivation for combining the teachings of Jalali with TERAS and Netemeyer.[10] Jalali paragraph 107 states that "the optimizer 208 determines (at 1310) the optimum segmentation for the well." However, Jalali never suggests that "determin[ing] optimum segmentation" has anything to do with "locat[ing] … intervals in the wellbore where

[9] Final Action, page 12, lines 4-6.
[10] Final Action, page 12, lines 12-13.

perforations as needed."[11] One of skill would not interpret "determin[ing] optimum segmentation" as a benefit arising from "locat[ing] ... intervals ... where perforations are needed." Thus, the Examiner's proposed motivation for combining the teaching of Jalali with TERAS and Netemeyer is misguided.

Therefore, claim 17 and its dependent are patentably distinguished over the cited references at least for the reasons given above. Claims 19, 21 and 48 each recite a feature similar to the above-quoted feature, and thus, are believed to be patentably distinguished over the cited references at least for the reasons given above.

Claim 17 also recites "assembl[ing] the instantiated models and the perforation locations into a *workflow*." The Examiner alleges that this feature is taught by TERAS page 4, paragraph 1:

> Engineering factors include drilling costs, platform, facilities, and pipeline costs, capital costs, and well performance. Economic factors include commodity prices, inflation factor, discount rate, political risk, and delays. To input data in TERAS, you enter values and build models that simulate aspects of your data.

While this paragraph teaches that TERAS allows a user to "enter values and build models," TERAS never suggests "assembl[ing]" "models" into a "workflow" as claimed. The process of "building" models is not the same thing as assembling models into a "workflow." Thus, claim 17 is distinguished over the cited references for this additional reason. Claim 19 recites a similar feature. Thus, claim 19 is similarly distinguished.

Independent Claim 31

Claim 31 recites "displaying an indication of the first case, the second case, and a parent child relationship between the first case and the second case." The Examiner points to Egyed p.126 last paragraph through p.127 first paragraph and Egyed Figure 3 as allegedly disclosing this claim feature. The cited passage refers to a process of "building a footprint graph."[12] The footprint graph includes "nodes" that relate to "overlaps between [the footprints of] scenarios."[13] However, "scenarios" are "test cases" that are

[11] Jalali paragraph 107, first sentence and last sentence.
[12] Egyed page 126, first sentence of last paragraph.
[13] Egyed page 126, section 5, second paragraph.

used to test "software systems".[14] The "footprint" of a scenario is "the source code that is executed while testing [the] scenario."[15] Thus, the nodes of the footprint graph have nothing to with the claimed "first case" and "second case". Recall, that the claimed first case "compris[es] a first set of models and planning variables for components of a value chain."

Furthermore, Egyed never suggests "displaying" the "footprint graph" or any portion thereof. Thus, the fact that Egyed mentions "establish[ing]" a "parent-child relationship"[16] between "nodes" cannot be construed as evidence for the anticipation of the claimed "displaying" "an indication of ... a parent-child relationship."

Finally, the Examiner offers "generat[ing] traceability information" as motivation for combining the teachings of Egyed with TERAS and Netemeyer. This motivation is irrelevant in the contexts of TERAS and Netemeyer. TERAS is a "user guide" that teaches one how to use "a comprehensive economic evaluation and analysis tool."[17] Netemeyer discloses a mechanism for "simulating transport phenomena in a complex system."[18] Neither TERAS nor Netemeyer is at all concerned with "developing" software. Thus, the problem of "design traceability" in "software development" is of no interest or utility in the contexts of TERAS and Netemeyer. Therefore, the Examiner's proposed motivation for combining the references is faulty.

Consequently, claim 31 is patentably distinguished over the cited references at least for the reasons given above.

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[14] Egyed Abstract, last seven lines.
[15] Egyed page 124, section 2, middle of second paragraph.
[16] Egyed page 127, left column, first three lines.
[17] *See* TERAS Title and page 1, first paragraph.
[18] *See* Netemeyer Abstract, lines 1-2.

CONCLUSION

In light of the foregoing amendments and remarks, Applicant submits the application is now in condition for allowance, and an early notice to that effect is requested.

If any extensions of time (under 37 C.F.R. § 1.136) are necessary to prevent the above-referenced application(s) from becoming abandoned, Applicant(s) hereby petition for such extensions. The Commissioner is hereby authorized to charge any fees which may be required or credit any overpayment to Meyertons, Hood, Kivlin, Kowert & Goetzel P.C., Deposit Account No. 50-1505/5460-01101/JCH.

Also filed herewith are the following items:

☐ Request for Continued Examination

☐ Terminal Disclaimer

☐ Power of Attorney By Assignee and Revocation of Previous Powers

☐ Notice of Change of Address

☐ Other:

Respectfully submitted,

/Jeffrey C. Hood/

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